BACKGROUND

Biomechanical assessments of multi-joint movements, such as squattings, are commonly performed by sports medicine professionals to identify deficits in mobility and neuromuscular control.1,2 There are many movement analysis methods, including visual observation, two-dimensional (2D) analysis, and three-dimensional (3D) motion capture. With a demand for efficiency in athlete screening, user-friendly movement analysis systems aided by artificial intelligence are increasing in popularity.3

OBJECTIVES

The purposes of this study were:

• To establish the interrater reliability of double-leg squat (DLS) and single-leg squat (SLS) scoring between trained physical therapists.

• To assess interrater reliability of DLS and SLS scoring between an automated 2D motion analysis system (Fusionetics™) and the majority score of the raters.

METHODS

• Following a five-minute warm-up on a stationary bicycle, 12 collegiate soccer players (mean age 19.2 years; seven females) were videotaped performing five repetitions of the DLS with arms overhead (front and side views) and the SLS with hands on hips (front view only) using a tablet device (Figures A-D; Table 1). The Fusionetics™ system automatically scored the movements based on binary kinematic criteria (Table 2).

• Five licensed physical therapists were trained in the scoring procedure. They watched the recorded squatting videos a maximum of four times at normal play speed and scored each participant’s performance of the DLS and SLS.

• Interrater reliability was calculated with the Fleiss Kappa statistic (Table 3).

RESULTS

• Strength of agreement between raters was poor to moderate for all scored items of the DLS and SLS.

• Strength of agreement between the raters and the automated 2D motion analysis system was also poor to moderate for all scored items of the DLS and SLS (except for Excessive Forward Lean during the DLS).

DISCUSSION

• Intra-rater reliability for the Fusionetics™ system has been reported as ranging from fair to excellent.4 The interrater reliability for this system has not been previously reported in the literature.

• The present investigation on interrater reliability indicates that scoring of the double- and single-leg squat across raters using the Fusionetics™ scoring criteria may be less than acceptable.

• For physical therapists that wish to implement 2D artificial intelligence systems, they should be aware that these methods may evaluate movement differently than the human eye.

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REFERENCES


